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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/574,507	09/05/2006	Jianjun Wang	047911-0103	2372

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EXAMINER	
MEKHLIN, ELI S	

ART UNIT	PAPER NUMBER
1795	

MAIL DATE	DELIVERY MODE
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/574,507	WANG ET AL.	
	Examiner	Art Unit	
	ELI S. MEKHLIN	1795	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *2/5/2010*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *57-60 and 62-78* is/are pending in the application.

4a) Of the above claim(s) *65-74,77 and 78* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *57-60,62-64,75 and 76* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

(1)

Applicant's Amendment filed February 5, 2010, has been entered. No new matter has been entered. Claims 57-60 and 62-76 are pending before the Office for review. Claims 65-74 are withdrawn from consideration as being directed toward a non-elected invention.

(2)

Response to Arguments

Applicant's arguments filed February 5, 2010, have been fully considered but they are not persuasive.

Applicant's response can best be summarized as arguing that the combinations of Mach and Gao and Mack and Peigney are not enabled. While Applicant's argument is informative, it is not persuasive because Applicant has not presented any evidence in support of said argument.

Specifically, it is Examiner's contention that Gao provides a motivation to a person having ordinary skill in the art at the time of invention to align (in a plurality) the nanosheets taught by Mack. The motivation being that such a configuration allows for use of the nanosheets in flat panel displays. Applicant rebuts this rejection by pointing out that the synthetic methods taught by Mack or incompatible with synthetic methods taught by Gao and that the resulting combination would not produce aligned nanosheets. However, aside from Applicant's assertions, there is no evidence to support Applicant's argument.

Applicant further argues that even though Peigney teaches carbon nanotubes with a specific surface area within the claimed range, this does not mean that the same surface area will be achieved in a carbon nanoflake. It is Examiner's contention that a person having ordinary skill in the art at the time of invention would have understood Piegney as provided a technique and motivation to produce a nanoflake with a specific surface area in the claimed range. Applicant's argument appears to be that the combination of Shang and Peigney is not enabled. Accordingly, Applicant is encouraged to provide evidence of non-enablement if Applicant believes that Examiner's contention is mistaken.

Accordingly, because Applicant only argues that the combination of references is not enabled and has failed to produce any evidence in support thereof, the previous ground of rejection is maintained.

(3)

Previous Grounds of Rejection

Claim Rejections - 35 USC § 103

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

Claims 57-59 and 75 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mack et al. (U.S. Publication No. 2003/0224168) in view of Gao et al. (U.S. Patent No. 6,361,861).

With respect to **claim 57**, Mack teaches carbon nanosheets having a thickness of approximately 0.34 nanometers, which is within the claimed range. Col. 14, Claim 16.

Mack is silent as to whether a plurality of the nanosheets are aligned.

However, Gao, which deals with nanostructured carbon materials, teaches that aligning a plurality of nanostructured carbon materials allows for their use in flat panel displays. Col. 1, Lines 30-31. Gao teaches that the nanostructured material is aligned on a substrate, meaning that the nanosheets would also be aligned on a substrate. Title and Abstract.

Therefore, it would have been obvious to a person having ordinary skill in the art at the time of invention to align a plurality of the nanosheets taught by Mack because Gao teaches that doing so allows for their use in flat panel displays.

With respect to **claim 58**, Mack teaches that the carbon nanosheets have a thickness of 0.34 nanometers, which is less than 1 nanometer. Col. 14, Claim 16. Mack further teaches that the carbon nanosheets comprise individual (one) graphite (graphene) layers. Col. 14, Claim 16.

With respect to **claim 59**, Mack teaches that the carbon nanosheets comprise individual (one) graphite (graphene) layers. Col. 14, Claim 16.

With respect to **claim 75**, Mack and Gao, as combined above, teach that carbon nanostructured materials, such as carbon nanosheets, can be used in field emission devices. Gao, Col. 1, Lines 17-18.

(4)

Claim 60 is rejected under 35 U.S.C. 103(a) as being unpatentable over Mack et al. (U.S. Publication No. 2003/0224168) in view of Gao et al. (U.S. Patent No. 6,361,861), as applied to claims 57-59 and 75 above, and further in view of Peigney et al. *Carbon*, (39) 2001 505-514.

With respect to **claim 60**, Mack and Gao, as combined above, teach carbon nanosheets with a thickness of 0.34 nanometers (less than 2 nm) and with lateral dimensions of between 1 to 2 micrometers (which is within the claimed range of 100 nm to 8 micrometers). Mack, Col. 14, Claim 16.

Although Mack and Gao, as combined above, teach a plurality of aligned nanosheets meeting the structural limitations of the presently claimed invention, they are silent as to the nanosheets specific surface area.

However, Peigney, which deals with nanostructured carbon materials, teaches that nanostructured carbon materials can be synthesized with a specific surface area of 1315 m^2/g. Page 508, Col. 2. Additionally, a person having ordinary skill in the art at the time of invention would have appreciated that the specific surface area of a compound influences the effectiveness of a structure because the greater the specific surface area the greater the amount of reactive area that is available in the structure.

Therefore, it would have been obvious to a person having ordinary skill in the art at the time of invention to produce a carbon nanosheet taught by Mack and Gao, as combined above, with a specific surface area of between 1000 m^2/g and 2600 m^2/g because Peigney teaches that such a specific surface area is possible and a person

having ordinary skill in the art at the time of invention would have appreciated that the specific surface area of a structure correlates to the effectiveness of the structure because the greater the specific surface area the more available area in the structure to react with other structures.

Finally, Mack teaches that the carbon nanosheet comprises individual graphite layers, meaning the nanosheet is in substantially pure form. Col. 14, Claim 16.

(5)

Claims 62 and 76 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shang et al. *Chemical Physics Letters* 358 (2002) 187-191 in view of Peigney et al. *Carbon*, (39) 2001 505-514 and Gao et al. (U.S. Patent No. 6,361,861).

With respect to **claim 62**, Shang teaches a carbon nanoflake. Abstract. Although Shang teaches that the nanoflake has a large surface-volume ratio, Shang is silent as to the specific surface area of the nanoflake.

However, Peigney teaches that carbon nanostructured materials can have a specific surface area of 1315 m^2/g and a person having ordinary skill in the art at the time of invention would have appreciated that the greater the specific surface area, the more effective the carbon nanoflake is in hydrogen absorption, which Shang teaches is one of the many uses of carbon nanoflakes. Peigney, Page 508, Col. 2; Shang, Page 187, Col. 2.

Therefore, it would have been obvious to a person having ordinary skill in the art at the time of invention to create a nanoflake, as taught by Shang, with a specific surface area of 1315 m^2/g because Peigney teaches that such a specific surface area is

possible and a person having ordinary skill in the art at the time of invention would have appreciated that the specific surface area of a nanoflake directly correlates with its use as a hydrogen absorption compound because the larger the specific surface area, the more hydrogen can be absorbed.

Additionally, Gao teaches that aligning a plurality of nanostructured carbon materials allows for their use in flat panel displays. Col. 1, Lines 30-31. Gao teaches that the nanostructured material is aligned on a substrate, meaning that the nanosheets would also be aligned on a substrate. Title and Abstract.

Therefore, it would have been obvious to a person having ordinary skill in the art at the time of invention to align a plurality of the nanoflakes taught by Shang and Peigney, as combined above, because Gao teaches that doing so allows for their use in flat panel displays.

With respect to **claim 76**, Shang and Peigney, as combined above, teach that carbon nanoflakes can be used in hydrogen absorption articles. Shang, Page 187, Col. 1.

(6)

Claims 63 and 64 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shang et al. *Chemical Physics Letters* 358 (2002) 187-191 in view of Peigney et al. *Carbon*, (39) 2001 505-514 and Gao et al. (U.S. Patent No. 6,361,861), as applied to claims 62 and 76 above, and further in view of Mack et al. (U.S. Publication No. 2003/0224168).

With respect to **claim 63**, Shang, Peigney and Gao, as combined above, teach a plurality of aligned nanoflakes on a substrate wherein the nanoflakes have the required specific surface area but are silent as to the thickness of the nanoflakes.

However, Mack teaches that carbon nanostructured material can be synthesized with thicknesses of 0.34 nanometers, which is less than 10. Claim 14.

Therefore, it would have been obvious to a person having ordinary skill in the art at the time of invention to produce the carbon nanoflakes taught by Shang, Peigney and Gao, as combined above, at a thickness of less than 10 nanometers because Mack teaches that thickness as little as 0.34 nanometers could be obtained and a person having ordinary skill in the art at the time of invention would have appreciated that progressively smaller nanoflakes allows for the miniaturization of devices in which those nanoflakes can be used, such as field emission detectors. Shang, Page 187, Col. 2.

With respect to **claim 64**, Shang, Peigney, Gao and Mack, as combined above, teach that the carbon nanoflakes have a thickness of 0.34 nanometers, which is less than 2. Mack, Claim 16. Additionally, a person having ordinary skill in the art at the time of invention would have appreciated that the specific surface area of a structure is a result effective variable that can be optimized to increase the performance of that structure. For example, the specific surface area of the carbon nanostructure could be increased to increase its hydrogen absorption capacity. Accordingly, as per the MPEP, where the general conditions of a claim are disclosed in the prior art it is not inventive to discover the optimal ranges by routine experimentation. MPEP 2144.05(II)(A). Here, Peigney discloses the importance of specific surface area and increasing the specific

surface area simply involves optimizing the teachings of Peigney to attain a desired specific surface area to achieve, for example, a desired hydrogen absorption when the nanoflake is used in a hydrogen absorption device.

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to ELI S. MEKHLIN whose telephone number is (571)270-7597. The examiner can normally be reached on 5/4/9.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jennifer K. Michener can be reached on 571-272-1424. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/ELI S MEKHLIN/
Examiner, Art Unit 1795

/Jennifer K. Michener/
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